



# SRR & CVR GOVT. DEGREE COLLEGE

(Autonomous) NAAC 'B+' Grade

## DEPARTMENT OF MATHEMATICS



### III B.Sc. MATHEMATICS

#### SEMESTER – V/VI, PAPER – VI A

#### NUMERICAL METHODS

#### MODEL QUESTION PAPER

Time: 3 Hrs

Max. Marks : 60

#### SECTION-A

Answer any **Five** questions. Each question carries **4 Marks**. **5×4 = 20 M**

1. Given  $f(0) = 3$ ,  $f(1) = 12$ ,  $f(2) = 81$ ,  $f(3) = 200$ ,  $f(4) = 100$  and  $f(5) = 8$ . Form a difference table and find  $\Delta^5 f(0)$ .
2. Show that i)  $(1 + \Delta)(1 - \nabla) = 1$  ii)  $E \nabla = \Delta$  iii)  $\Delta - \nabla = \Delta \nabla$
3. Using Gauss forward interpolation formula, find  $f(25)$  given that  $f(20) = 14$ ,  $f(24) = 32$ ,  $f(28) = 35$ ,  $f(32) = 40$ .
4. Use Gauss Backward Interpolation formula, find  $f(32)$  given that that  $f(25) = 0.2707$ ,  $f(30) = 0.3027$ ,  $f(35) = 0.3386$ ,  $f(40) = 0.3794$ .
5. Using the following table, compute  $\frac{dy}{dx}$  at  $x = 1$ .

$x$	1	2	3	4	5	6
$y$	1	8	27	64	125	216

6. Find  $f'(1.5)$  from the following table.

$x$	1.5	2.0	2.5	3.0	3.5	4.0
$f(x)$	3.375	7.000	13.625	24.000	38.875	59.000

7. By using Simpson's  $\frac{1}{3}$  rule, evaluate  $\int_{-3}^3 x^4 dx$  by taking 7 equidistance ordinates.
8. Evaluate  $\int_{-3}^3 x^4 dx$  by Trapezoidal rule with  $h = 1$ .

9. Solve the differential equation  $\frac{dy}{dx} = x + y$ , with  $y(0) = 1$ ,  $x \in [0, 1]$  by the Taylor series expansion to obtain  $y$  for  $x = 0.1$ .
10. Using Taylor series expansion solve the equations  $\frac{dy}{dx} = x^2 + y^2$  for  $x = 0.4$  given that  $y = 0$  when  $x = 0$ .

**SECTION – B**

Answer **ALL** the following questions.

**5 X 8 = 40 M**

11. (a). Evaluate (i)  $\Delta^2(3e^x)$  and (ii)  $\Delta^2(ab^{cx})$ .  
(Or)  
(b). Given  $u_0 + u_8 = 1.9243$ ,  $u_1 + u_7 = 1.9590$ ,  $u_2 + u_6 = 1.9823$ ,  
 $u_3 + u_5 = 1.9956$ . Find  $u_4$ .
12. (a). Using Stirling's formula, find  $y_{28}$ . Given  $y_{20} = 49225$ ,  $y_{25} = 48316$ ,  
 $y_{30} = 47236$ ,  $y_{35} = 45926$ ,  $y_{40} = 44306$ .  
(Or)  
(b). Apply Bessel's formula to find the value of  $f(27.4)$  from the table.

$x$	25	26	27	28	29	30
$f(x)$	4.000	3.846	3.704	3.571	3.448	3.333

13. (a) Find  $\frac{dy}{dx}$  at  $x = 1.76$  from the table.

$x$	1.72	1.73	1.74	1.75	1.76
$y$	0.17907	0.17728	0.17552	0.17377	0.17204

(Or)

- (b) Find  $f^{-1}(0.6)$  from the following table.

$x$	0.4	0.5	0.6	0.7	0.8
$f(x)$	1.5836	1.7974	2.0442	2.3275	2.6510

14. (a) By using Simpson's 3/8 rule, evaluate  $\int_0^1 \frac{1}{1+x} dx$  with  $h = \frac{1}{6}$

(Or)

- (b) Evaluate  $\int_0^{\pi/2} \sqrt{\sin x} dx$  by Weddle's Rule.

15. (a) Solve the equations  $y' = -y$  with the condition  $y(0) = 1$  for  $x = 0.04$  in 4 steps by Euler's method.

(Or)

- (b). Apply Runge – Kutta method, find the solution of the differential equation  $y' = 3x + \frac{1}{2}y$  with  $y_0 = 1$  at  $x = 0.1$ .